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## ZOOLOGY

TREMATODE PARASITES IN AMERICAN CRAYFISH.—Professor Kellicott has recently called attention to the fact that American crayfish are subject to invasion by Trematode parasites.<sup>1</sup> His remarks have recalled to me some observations which I made in 1879, and which I now record, because in the interval the Distomes of the European *Astacus fluviatilis* have been subjected to renewed examination,<sup>2</sup> and one of them has been accused as the cause of the pest, which has, within the last five years, effected such ravages in the crayfish tanks of France and Germany.

Two Distomes are found abundantly in *Astacus*—*D. isostomum* Rudolphi, and *D. cirrigerum* v. Baer. The former lives free in the body cavity, is immature, measures between 2 and 3<sup>mm</sup> in length, and is immediately recognized by the equality in diameter of its anterior and ventral suckers. According to Harz, it is harmless to its host, and Zaddach thinks that it is developed from the eggs of *D. cirrigerum*.

It is my impression that I have also met with *D. isostomum* in American crayfish, but the only specimens I have preserved are from Germany.

*D. cirrigerum* is always encysted, is most abundant in the muscles of its host, and produces, according to Harz, the crayfish pest, which has consequently been styled a "Distomatosis." Zaddach, v. Linstow and other observers contest this view, believing that, after encystment, the Distomes can occasion little or no inconvenience. Although an encysted form, *D. cirrigerum* produces eggs, and is, of course, self impregnating. The minute encapsuled forms described by Professor Kellicott, are very probably young stages of this species.

In my collection of Trematoda, I find one which I marked, when discovered, "*D. nodulosum* Zeder, from a cyst in the ovary of *Cambarus*," probably *C. propinquus*. This species (Fig. 1), belongs to a small group of Distomes in which the anterior

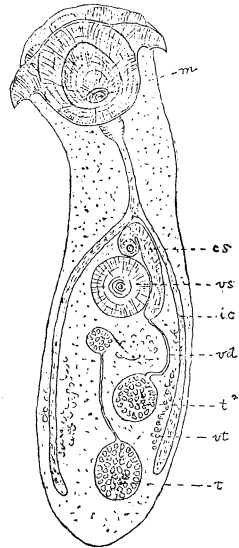


FIG. 1.—*M*, the mouth in the anterior sucker; *cs*, the sac of the cirrus opening in front of *vs*, the ventral sucker; *ic*, one of the intestinal caeca; *vd*, vas deferens leading directly from the anterior testis *t* to *cs*; *vt*, the vitelline; *t*, the posterior testis, the vas deferens of which appears to end in a vesicula seminalis, between which and *vd* is the blastema for the ovary.

<sup>1</sup> Proc. Am. Soc. Microscopists, Chicago Meeting, 1883, p. 115.

<sup>2</sup> C. O. Harz. "Die sogenannte Krebspest, &c." Wien, 1881. Rev. by Dr. v. Linstow in Bericht über nied. Thiere in Archiv. für Naturg., 1883.

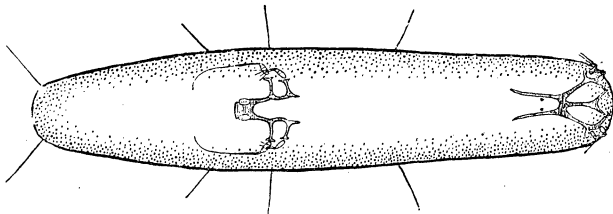
G. Zaddach. Zool. Anz., 1881, 398 and 426.

sucker is produced into papillæ, and is found free in the intestinal canal of various European fresh-water fish (*Perca*, *Lucioperca*, *Esox*), and encysted on the outer surface of the intestine in *Acerina*. V. Linstow<sup>1</sup> indicates *Paludina impura* as the intermediate host into which the cercariæ of *D. nodulosum* penetrate and encyst themselves. Their presence in an encapsuled condition in *Acerina* he explains by supposing that the cercariæ have either wandered directly into the little fish, or that they have been swallowed while still free in the mollusk.

My specimen resembles the encysted state from *Acerina* in the fact that only the male organs are developed, the few female organs being undifferentiated. The structure of the mouth suckers is not entirely in accordance with v. Linstow's description. As far as I can make out from my only specimen, the periphery of the sucker is prolonged at the sides anteriorly into two somewhat triangular flaps, and its muscular wall is pushed out in front into four papillæ.

I have not met with *D. nodulosum* as a fish parasite, but it is probably to be found mature in the intestinal canal of various fresh-water fish. It remains to be seen whether the crayfish is normally the intermediate host. The researches of the late Professor Ercolani<sup>2</sup> have shown how easily some Trematodes accommodate themselves to new surroundings, and it is quite possible that this solitary specimen of *D. nodulosum* had merely "wandered" into an unaccustomed host.—R. Ramsay Wright, *School of Practical Science, Toronto*.

PTEROLICHUS FALCIGER MEGNIN, OBSERVED IN THE UNITED STATES.—The "nymphæ hypopiale" (*Hypoderas columbæ* Murray) of this mite has been noticed by the writer on several occasions in the tissues of the domestic pigeon. As stated by Robertson, it occurs most abundantly in the connective tissue about the large veins near the heart, but a few may be found under the skin in the region of the arm-pit. It is an elongate, sack-like, whitish body, about 1.5<sup>mm</sup> long, with smooth surface, and very short legs, the two anterior pairs of which are widely separated from



Nymphæ hypopiale of *Pterolichus falciger*, enlarged.

the two posterior pairs. No mouth-parts are visible with one of

<sup>1</sup> Arch. für Naturg., xxxix, 1873, p.

<sup>2</sup> Dell' adattamento della specie all' ambiente. Bologna, 1881-2.

Spencer's 1-10 inch immersion objectives, and as these appendages can be seen with ordinary objectives in very much smaller mites than this, it is safe to assume that there are none. The character of the legs, with their chitinous rings and highly-developed epimera, would seem to be sufficient to place this form with the Sarcophtidæ, even if none of the other stages existed. The legs are not terminated by two hairs, as is supposed by some writers, but in the three anterior pairs by a long claw with a slightly swollen tip, which probably represents the tarsal sucker of the normal form.—*H. Garman.*

ON THE MORPHOLOGY OF THE "LATERAL RODS" OF THE OPHIUROID PLUTEUS.—Two groups of Echinoderms, the Ophiuroidea and the Echinoidea, have a larval stage in their development, which is known as a pluteus. In both of these groups the larval appendages, unlike those of the young of other Echinodermata, have the form of long calcareous rods, encased in a covering like that which forms the fleshy walls of the body.

Homologues of all these appendages or rods of the Ophiuran pluteus have been found in those of the Echinoid, with the exception of by far the most prominent pair, which is first to appear and last to be absorbed and known at the lateral arms.<sup>1</sup> These are not commonly mentioned as existing in the pluteus of the Echinoid genera, and many authors say that they are unrepresented. On the other hand a pair of appendages, which seems to be without homologues in the pluteus of the Ophiuran, exists in the pluteus of certain genera of Echinoidea, as *Arbacia*, and are called the "apical" or "anal" rods or appendages. The lateral rods of the Ophiuran larva bear so many resemblances to these so-called anal appendages of *Arbacia*, that it seems natural to homologize the one pair with the other.

A new pluteus from the Bermudas, a description of which I hope later to publish, seems to stand intermediate between that of *Arbacia* and the young Ophiuran in respect to the size, and comparative development of the lateral or apical arms. It supports in all particulars the homology of these two appendages which I have pointed out above.

The relative time at which the development of the lateral arms in the pluteus of Ophiurans takes place, and that when the apical rods of *Arbacia* develop, may not seem to support the theory which has been advanced in regard to their homology. The lateral rods of the Ophiuran pluteus are among the first of these appendages to develop, while the posterior pair of arms in *Arbacia* are well developed, and the so-called antero-lateral are far along in growth, before any trace of the apical rods appears. This order of development would seem a fatal objection to the pro-

<sup>1</sup> The nomenclature of the arms adopted here is that used by Balfour in his Comparative Embryology, Vol. 1, page 470.

posed morphological identity of the two, if the time of their appearance is the only index of homology in Echinoderm larval appendages. The comparative anatomy of the rods of the body of the pluteus seems to me to point without doubt to an homology of the lateral arms of Ophiuran larval and the apical rods of Arbacia. All the appendages of the various forms of Echinoderm larvæ may be regarded as specially, or perhaps independently acquired structures, which are destitute of any great value, comparatively speaking, as far as the phylogeny of the Echinoderms is concerned. If I am right in looking at them in this way, the stages of growth in which the larva of Arbacia and the Ophiuran was, when on the one hand an apical<sup>1</sup> pair of rods, and on the other the lateral arms appear, need not coincide and yet the two may be homologically the same.—*J. Walter Fewkes.*

PLATEAU'S RESEARCHES ON THE ABSOLUTE FORCE OF THE MUSCLES OF BIVALVES.<sup>2</sup>—The great *apparent* force of the adductor muscles of lamellibranch mollusks is a fact universally known, and which forms the basis of La Fontaine's fable of the rat and the oyster. Fishermen and naturalists have made this the subject of interesting remark. Thus Darwin, speaking of the great *Tridacna* of tropical seas, says, that any one imprudent enough to introduce his hand between their valves, would be unable to withdraw it while the animal lived. Léon Vaillant relates that the divers whom he employed at Suez, and who procured him specimens of *Tridacna elongata*, advised him not to touch these animals on the side of the opening of the shell.

Plateau then adds: "I myself, in the course of experiments related in this notice, have been witness, whenever I wished to, in *Mya arenaria*, of a fact at first sight very surprising; if in the living mollusk we break, with the aid of a knife or forceps, a small area of the shell in the neighborhood of the hinge, a crackling noise is heard, and we see the valves open and striking together with a loud noise under the influence of the traction of the adductor muscles."

Darwin's observations on the transportation of *Unio* suspended by its closed valves to a duck's foot; of a *Cyclas* fixed in the same way to the foot of a water-beetle (*Dytiscus*), and of *Cyclas* attaching itself to the foot of a triton so as to amputate it, are noticed before speaking of the observations of others who submitted the adductor muscles to experiment.

Noticing A. Fick's experiments on the elongations, etc., which the adductor muscles of Anodonta; those of *L. Vail-*

<sup>1</sup> From what has been said it is thought proper to suggest the name lateral rods to designate these appendages as well as their homologues in the Ophiuroid for which it has long been used.

<sup>2</sup> Recherches sur la force absolue des muscles des invertébrés. Prem. Partie. Force absolue des muscles adducteurs des mollusques Lamellibranches. Par M. Professor Felix Plateau. Extrait du Bulletins de l'Académie royale de Belgique, VI, 1883, 8vo, pp. 36.

lant on the measurement of the force displayed by the adductors of bivalves, he refers at some length to those of A. Coutance, made especially on the *Pecten maximus*.

Plateau then describes at length his own interesting experiments, from which he draws the following conclusions:

1. The only way to carefully compare the muscular force of lamellibranch mollusks with that of the higher animals consists in estimating the absolute forces of the muscles by the square centimeter of transverse section.

2. The result of this comparison shows that the absolute force muscles of the bivalves are generally smooth, while the muscles of animal life of vertebrates are composed of striated fibers. The objection is a serious one; but with the result to place me in the best possible condition, since I have undertaken some researches of the same kind on the Crustacea. The muscles of these articulates are striated, and present a texture very near to that of vertebrates.

THREE NEW FAMILIES OF FISHES ADDED TO THE DEEP-SEA FAUNA IN A YEAR.—In addition to the family of Eurypharyngids, fully described lately by Mr. Ryder and myself, two new family types were added to the deep-sea fauna by the exploration of the U. S. Fish Commission on steamer *Albatross* in 1883. These will be called Derichthyidæ and Stephanoberycidæ.

The Derichthyids are represented by one specimen, which has an eel-like form, a serpentiform head, with *well developed maxillaries*, as well as palatines, both bearing bands of teeth, a *well defined neck*, and the scapular arches remote from the skull. The color is a ruddy brown. Mr. Ryder and myself will describe the form at length under the name *Derichthys serpentinus*. It appears to be the type of a new order, and is especially interesting as being the only fish (so far as I recollect), with a true neck. Some may urge Hippocampus as a necked fish, but the doing so would be quite improper, for the contracted portion is behind the pectorals.

The Stephanoberycides appear to be Berycoidea, with abdominal or subabdominal ventrals, a dorsal of articulated rays, a caudal with numerous spinous rays in the procurent upper and lower extensions, a cavernous head, toothless palate, and scales with spinous surfaces. It includes my *Stephanoberyx monæ* and *Acanthocheenus lutkenii*; the latter has abdominal ventrals and branched rays, thus differing from Stephanoberyx, but it is not absolutely impossible that it may prove to be merely the mature form of the other, which was based on a small specimen.

Another interesting fish, from the same collection, is an Alepocephalid, with the body as well as heads caeless, which I shall describe as *Aleposomus copei*.—*Theodore Gill*.

ZOOLOGICAL NOTES.—Dr. C. Bulow (*Archiv. für Naturgeschichte*, 1883) gives the result of experiments on the worms carried on by him at Rostock. Bonnet beheaded a worm eight times, and regeneration followed each time, but the ninth time only a bud appeared. The results obtained by Reaumur, O. F. Müller, and others, are recapitulated. From the results obtained it is concluded that the head of an earth-worm is composed of eight segments, occasionally of nine, but more often of a smaller number, especially when the animal is cut into relatively small parts. When the new head does not contain the normal number of head-segments, the mouth-parts always serve their purposes. If a worm be cut in pieces, each containing eight or nine segments, each piece is tolerably sure to become a perfect worm. When a worm was cut into fourteen pieces, one died, but the rest reproduced both head and tail.—Dr. v. Linstow (*Archiv. für Naturg.* 1883) describes the Nematodes, Trematodes, and Acanthocephali gathered in Turkestan by Professor Fedtschenko. The number of Nematode species (76) is large, compared with that of the Trematoda (15), and of the Acanthocephali (3), but this is accounted for by the fact that the larvæ of the two latter families live in aquatic invertebrates, which are scarce in the unwatered plateau of Turkestan. Eighteen new species of parasitic nematodes are described, including an *Ascaris* of the sturgeon, one of *Silurus glanis*, and one of *Pastor roseus*; a Physaloptera of *Tropidonotus hydrus*; a Filaria of *Phalacrocorax carbo*, and one of *Turdus atrogularis*; *Aprocta cylindrica* from *Petræa cyanea*; *Heterakis curvata* from *Perdix græca*; *Oxyuris inflata* from *Pterocles arenaria*, and *O. lanceolata* from certain insects. All the species of Gordius and Mermis (8) appear to be new. Of the Acanthocephali two species of Echinorhynchus, from *Petræa cyanea* and *Astur palumbarius*, respectively, are new, as are six forms of Distomum and one of Monostomum among the trematodes.

*Amphibians and Reptiles.*—M. P. Albrecht notes the presence of true ossified epiphyses upon the spinous processes of many of the vertebræ of *Hatteria punctata*, strikingly resembling the same epiphyses in mammals. The skeleton examined (an adult) had, besides the pro-atlas, 8 cervical, 17 dorso-lumbar, 2 sacral, and 15 caudal vertebræ. The extremity of the tail was in neogenesis. A pair of these epiphyses occur on the 7th and 8th cervicals, and on the dorso-lumbar from the 2d to the 10th, inclusive, and on the 14th and 15th of that series. The remaining two dorso-lumbar, the sacrals, and the first four caudals have a single epiphysis evidently formed by the union of the right and left elements. The epiphyses increase in size to the 16th dorso-lumbar, and thence diminish.—D. J. v. Bedriaga (*Archiv. für Naturg.*, 1883), gives descriptions of the Amphibia and Reptilia of Corsica, which he states to be zoologically almost an unknown

land. He also devotes a large space to the external and internal characters, variations, and development of *Megapterna montana* Savi, and a list of its numerous synonyms, which include the generic names of Triton, Molge, and Euproctus. He believes that the genus Triton should be held to include not only Triton proper, but also Hemitriton, Pelonectes and perhaps Euproctus and Megapterna. Other Corsican amphibia are *Salamandra maculosa*, *Hyla viridis*, *Discoglossus pictus*, *Rana esculenta*, sub sp. *viridis*, and *Bufo variabilis*. Our author distinguishes two species of Euproctus, *E. rusconii*, found in Sardinia, and *E. pyrenæica*, a native of Spain, Portugal, and the Pyrenees. The Reptilia of Corsica are *Tropidonotus natrix*, *Zamenis gemonensis*, *Platydictylus mauritanicus*, *Notopholis fitzingeri*; *Lacerta oxycephala*, *L. muralis*, and *L. viridis*, *Vipera aspis*, *Emys orbicularis*, and *Testudo græca*.

*Birds.*—Among the more valuable articles in *The Auk*, for January, are Mr. Brewster's notes on the summer birds of Berkshire county, Mass.; Mr. N. S. Goss' notes on the breeding habits of the American eared grebes; and Mr. Bicknell begins an interesting study of the singing of our birds, to be continued in the next number. After speaking of the connection between molting and the songs of birds, and of song as the result of mental excitement, of singing while on the wing, the author treats of seasonal variation in song; vocal variation with age; individual vocal variation and abnormal vocal variation.—From the "general notes" we glean the following items: Mr. Montague Chamberlain saw two crows successively charge upon a robin's nest and each fly away with an unfledged robin in its claws. Mr. J. W. Fewkes records the observation of several persons near Eastport, who declared that the crows take up in their claws sea-urchins and carry them up away from shore. "One intelligent person, not a naturalist, said he had observed the crows *transporting them in their claws*."—The nesting habits and eggs of the ruby-crowned kinglet; of *Myiodestes townsendi*; of the saw-whet owl; of the broad-winged hawk; and a newly discovered breeding place of Leach's petrel in Rona, one of the Hebrides, are described. The black-throated auk, a North Pacific sea-bird, is recorded as occurring in Wisconsin.

*Mammals.*—The beautiful chromo plates illustrating the first volume of the mammals of Brehm's Thierleben, are well worthy of examination, and the publication of these superb colored plates will confer a new value on what is a standard popular work. The plates illustrating the lion, tiger, leopard, puma, but more especially the orang, chimpanzee and the gorilla, are as successful as any. These plates can be had of B. Westermann & Co., New York.